

REMARKS

Claims 1-66 are pending. Claims 23-58, and 64-66 are withdrawn from consideration. Claim 13 has been amended. Claims 1-22 and 59-63 are rejected. Claims 1-66 remain in the case.

Claim 13 has been amended to address the concern raised in paragraph 1 of the Action.

Claims 1-10, 13-22, and 59-63 stand rejected under Section 103(a) based on Carr et al., and claims 11 and 12 stand rejected under Section 103(a) based on Carr et al. in view of Girot et al. The examiner urges that "Carr *et al.* discloses dense mineral oxide supports comprising a mineral oxide matrix and an interactive polymer network which is rooted in pores and on the surface of the mineral oxide matrix (see abstract). The lowest porosity explicitly disclosed is 31%, which occurs at a sintering temperature of 900 degrees. It is consider (sic: "considered") that it would have been obvious to one of ordinary skill in the art to have made the porosity <30%."

The abstract of Carr *et al.* does *not* disclose "a mineral oxide matrix and an interactive polymer network which is rooted in the pores." The abstract of Carr *et al.* discloses a stable stationary phase for chromatography which comprises porous ZrO₂ spherules coated with a cross-linked polymer coating." There is nothing in this description to suggest that the polymer network is rooted in the pores of the mineral oxide matrix.

Nor is there any disclosure in the remainder of the Carr document to suggest a mineral oxide matrix with an interactive polymer matrix rooted in the pores as claimed by applicants. Carr discloses two embodiments. A first embodiment relates to ZrO₂ spherules prepared by dispersing an aqueous sol of colloidal ZrO₂ particles in a medium which extracts water from the dispersed sol to produce gelled ZrO₂ spherules which are then heated to yield porous ZrO₂ (column 4, lines 47-58). In an alternative embodiment, the porous ZrO₂ spherules are coated with a hydrophobic or hydrophilic, crosslinked polymer.

For both embodiments, the teaching of Carr *et al.* is that pore volume should be *maximized*, not controlled to values of porosity of less than 30% as presently claimed. The

increased pore diameter is desired to allow the proteins which are to be separated to diffuse freely into the internal void volume, thereby reaching all available surface area. Thus, Carr *et al.* states that "the data summarized in Table 1 show that it is possible *to increase the average pore diameter* by increasing the firing temperature from 400° to 900°C. The surface area and pore volume decrease with increasing firing temperature. Chromatographic activity of the ZrO₂ spherules is determined by the parameters of the surface area, average pore diameter and pore volume. Accordingly, the appropriate firing temperature is selected."

Similarly, Carr discloses that a colloid size should be chosen which *maximizes* porosity and pore diameter. For example, Carr states that "the data summarized in Table II show that it is possible to control the average pore diameter of the fired spherules by appropriate selection of the colloid size of the ZrO₂ source. Larger colloids produce fired spherules with *larger pore diameters and pore volumes*" (column 14, lines 1-5).

The examples of Carr clearly select firing temperature and colloid size so as to maximize porosity and pore size, typically by using a firing temperature of 600°C. A further emphasis on *increasing* porosity and pore size is found in Example 8, which discloses that "centrifugation, removal of the supernatant, and redispersion of the colloidal ZrO₂ starting material results in increases in the average pore diameter, pore volume and surface area of the fired spherules...regardless of mechanism, the centrifugation treatments describes in Examples 6-8 provide a method of preparing spherules with increased average pore diameter, pore volume and surface area relative to spherules prepared from untreated colloidal ZrO₂ sols."

The examples which relate to coated particles all use particles prepared according to Example 2. Example 2 fires the ZrO₂ spherules at 600°C. As shown in Table 1, these particles have a pore volume of 36%. There is no suggestion to fire at a higher temperatures in order to reduce this pore volume. Indeed, as noted above, *the clear suggestion in Carr et al. is that pore volume and pore size should be maximized.* Accordingly, there is no suggestion to modify the firing temperature to be used in order to produce a matrix with a pore volume of less than 30% as presently claimed. Indeed, a

modification of Carr to decrease pore size and volume would be contrary to the teaching of the reference. If a proposed modification renders a prior art invention unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. MPEP §2143.01 and *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984). Applicants produce particles with low porosity by firing at high temperatures, in the range of 900°C to 1500°C, and preferably between 1000°C and 1400°C, so as to melt the submicroparticles together and reduce the particle diameter and reduce the pore volume to less than about 30%. This low porosity material is essential to firmly anchor the interactive polymer network on the beads.

Giot *et al.* is added for a teaching of polysaccharide organic polymers as the material of the polymer network. Giot *et al.* does not overcome Carr's failure to suggest a matrix with a porosity of less than 30% in which an interactive polymer network is rooted.

In view of the foregoing amendments remarks, it is believed that all claims are in condition for allowance. Reconsideration of all rejections and a notice of allowance are respectfully requested. Should there be any questions regarding this application, the examiner is invited to contact the undersigned attorney at the phone number listed below.

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